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# The Effect of Forest Institution Connectedness, Incentive Participation Program, and Social Capital on Public Participation and Welfare as Mediators of Forest Management in Baluran National Park

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## Abstract

The effect of forest institution connectedness, incentive participation program, and social capital on public participation and welfare as mediators of forest management were conducted in the forest conservation area of Baluran National Park, East Java, Indonesia. The problem facing this area is that the five buffer villages of Wonorejo, Sumber Waru, Sumber Anyar, Bajul Mati, and Watu Kebo exploit the forest's resources for their own economic reasons. The purposes of this research are to analyze and explain: (1) the effect of the forest institutions connectedness on public participation; (2) how welfare mediates forest institutions connectedness to public participation; (3) the effect of incentive participation programs on public participation; (4) how welfare mediates the effect of incentive participation programs on public participation; (5) the social effect capital on public participation; (6) how welfare mediates social capital's effect toward public participation; and (7) welfare's effect on public participation. The survey method and questionnaires were used for a proportional random sampling of 170 respondents. They are 120 households that were members of the forestry community training center and 50 respondents from the staff of Baluran National Park. Validity and reliability testing of instruments and hypothesis were performed using WarpPLS 5.0 software. The results show: (1) forest institutions connectedness to public participation does not contribute positive significant effect; (2) the effect of forest institution that is related to public participation has been fully mediated by welfare; (3) incentive participation programs have a positive significant effect on public participation; (4) welfare partially mediates the effect of incentive participation programs on public participation; (5) social capital has a positive significant effect on public participation; (6) welfare mediates social capital's effect on public participation; and (7) welfare has a positive significant effect toward optimizing public participation in forest conservation management in the Baluran National Park. Practical implications of this research are: (1) the contribution of nontimber forest products

as a proportion of families' income is between 12.99% and 28.46%; and (2) based on the classification of public participation especially in four programs (participation in planning program, implementation, benefit-sharing, and evaluation and monitoring) that are low level at 47.1%, middle level at 33.5%, and high level at 19.4%.

**Keywords:** incentive participation program, social capital, welfare, public participation, social forestry management

## 1. Introduction

A national park, as a forest conservation area, has a variety of flora and fauna which can be relied upon to ensure the human survival for now and future [1]. The majority of these parks have now faced threats and interferences such as encroachment, and illegal cultivation continues to increase over time [2]. Threats and disturbances in these areas are caused by various factors, namely (1) the institutions role in forest conservation management and local population participation level of the are still not optimum (especially in the case of those living around the forest); (2) the lack awareness about the conservation area is still very low among local people; (3) the education level of local people is low; and (4) there is a lack of agricultural land [1, 3].

The forest destruction in Baluran National Park includes: (1) forest fires in 2014, with 132 fires covering an area of around 2005.90 ha. Rather than natural factors, the main causes of forest fires are local people not acting responsibly, a lack of security personnel guarding the forest, and weak law enforcement. Forest fires impact heavily on the flora and fauna. (2) Clearing activities as a result of 400 ha being devoted to agricultural plants business. (3) Timber theft (as well as theft of firewood, fruit tart, hazelnut, *gebang* trees, ornamental fish and over grassing) especially in the Labuhan Merak resort. (4) Cattle grazing is a problem that is quite prominent, especially in the areas of Karangtekok, Labuhan Merak, and Balanan with about 3450 ha. Cattle grazing (cows and goats) is widespread, with an average of 1447 head of cattle per day. As a result of this illegal grazing, the soil becomes solid, which is harmful to plants and vegetation that could potentially be survival disruption of the park, as well as deer, antelope, and bison (the unique wildlife of Baluran National Park). (5) Local transmigration settlements since 1976, covering an area of 57 ha in Pandean area of Wonorejo village. (6) Illegal encroachment and the tilling of the soil. (7) Hunting of wildlife by people with firearms, snares, poison, and sap that often occurs during the dry season. Various factors affect the behavior and movement patterns of animals, including a limited source of drinking water for animals, especially in the dry season. Based on the above phenomena, this paper focuses on the damaged forest in the Baluran National Park, caused by the poor level of public participation [4–6].

There are some previous studies which discuss public participation in the forestry management program. These include: (1) studies which explained the factors affecting public participation in forestry management, because of the role of forest institution connectedness by Baynes et al. [7], Muro and Namusonge [8] and Lise [9], (2) the quality of forest institutions as good governance will be able to create conditions of security, belief, trust, and economic welfare by Hans-Jurgen [10] and Akib et al. [11], (3) the effects of incentive participation program for social forestry management in increasing public participation by Adhikari et al. [12], Djamhuri [13], and Kaseya and Kihonge [14], (4) incentive participation program effects in relation to welfare Rahut et al. [15], William and Ayuk [16], Das and Sarker [17], (5) the social capital effect on public participation by Sara et al. [18] and Sharpe

[19], (6) social capital effect on public welfare by Grootaet [20] and Narayan and Pritchett [21], (8) how welfare effect on public participation in development programs Rahut et al. [15] and Akamani and Hall [22].

The issue of differences in measurement of incentive participation program is a gap in this research. Adhikari et al. [12] measured incentive participation program with six indicators, they are: (1) access to forests and availability of forest products, (2) financial support to supplement household income, (3) social security and cohesion through local institution building, (4) investment in local community infrastructure and development, (5) well-defined & enforced property rights over forest resources assigned to the users, and (6) payment for environmental services. The research's purposes of Adhikari et al. [12] are: (1) to determine the relationships between different incentive participation program and the level of public participation of user group members; (2) to explore how households might respond to any changes in the incentive participation program, in terms of their decision to participate in common property resource governance; and (3) to propose/recommend how organizational incentive participation program can be better integrated in order to induce more effective public participation of users in the governance and management of property resources. The indicators of public participation were measured based on (1) membership length; (2) representation on the executive committee; (3) level of public participation in meetings, (4) in decision-making, and (5) in implementation; and (6) overall benefits.

While Djamhuri [13] measured incentive participation program with seven indicators, they are: (1) forest village population; (2) villages forests/WPH; (3) number of forest village community (LMDH) trustee board members; (4) percentage of Tumpang Sari Farmers on the LMDH trustee board; (5) tree coverage on foundation of the LMDH; (6) current tree coverage; (7) trustee board members attendance of routine meetings. The indicative numbers of LMDH trustee board members and percentage of Tumpang Sari Farmers on LMDH trustee board consist of: (1) formal education; (2) household annual income; (3) use of feed/fodder from state forest land; and (4) use of firewood from forest land. Djamhuri [13] said Tumpang Sari is an incentive participation program which is traditional in forest management. Government and society integration provides a better incentive participation program in the hope that the public will be will contribute in the state forest management.

Kaseya and Kihonge [14] measured incentive participation program with three indicators, they are: (1) civic education, (2) financial incentives both transport and lunch allowances, and (3) scheduling of forums/meetings. The study result was corroborated by the findings from the open interview which indicated that 62.5% of the respondents concurred that financial incentives are offered to participants. Measurements of incentive participation program in this research refers to [12], but its indicators are based on research object conditions.

The second gap of this research is the differences of social capital's measurements done by Grootaet [20] and Narayan and Pritchett [21]. Grootaet [20] measured social capital into six dimension of social capital, they are: (1) density of membership, (2) heterogeneity index, (3) meeting attendance, (4) decision making index, (5) membership dues, and (6) community orientation.

Narayan and Pritchett [21] measured social capital into six variables, they are: (1) heterogeneity members, (2) inclusiveness members, and (3) performances members. Social capital's indicators consist of: (1) membership, (2) characteristic of membership; (3) values and individual's **behaviors**.

Measurement of social capital in this study refers to Grootaet [20], who measures social capital as a factor in the reduction of poverty and increase in prosperity, but indicators of social capital of this research based on research object condition. Welfare provision would increase the role of public participation in development.



Increased public participation will reduce transaction costs and the cost of control, raise output and further improve the welfare of the community.

Rahut et al. [15] suggested increasing public participation in collaborative forest management (CFM) while adding welfare as a mediation variable which will affect social capital and also affect public participation.

The novelty of research are: (1) to examine the integrative model with purposes to insure weather forest institution connectedness, incentive participation program, social capital and public welfare still have positive significant effect on public participation; (2) to analyze the level of public participation based on participation in planning program, implementation, benefit-sharing; and evaluation and monitoring of the forest conservation management in Baluran National Park.

After all, the purposes of this study that were presented here will be to analyze and explain: (1) effect of the forest institutions' connectedness to public participation; (2) how welfare mediates forest institution connectedness to public participation; (3) the effect of incentive participation programs on public participation; (4) how welfare mediates the effects of incentive participation programs on public participation; (5) social capital's effect on public participation; (6) how welfare mediates social capital's effect on public participation; and (7) welfare's effect on public participation.

## **2. Material and method**

Data were collected during July–December 2017 through interview, research questionnaires, and documentation. Interview was conducted to determine the respondents' answers to a questionnaire relating to the variables that have been used in this study.

The sampling method is proportional random sampling. The unit analysis is the heads-of-household who are members of the forestry community training center (120 people) and the staff of Baluran National Park with 50 people. All of them are 170 respondents in total (see **Table 1**). The construct validity of reflective indicators were tested based on convergent validity, discriminant validity, composite reliability [23]. Variable with formative indicators were tested based on the values of full collinearity variances inflations factor.

The method of data analysis used in this study is structural equation modeling using WarpPLS 5.0. This research is based on working with numbers, and the data are tangible, analyzed using statistics to test hypotheses or answer specific research questions and to make predictions that a particular variable affects other variables [24].

To test mediation roles the causal-step approach of Baron and Kenny was used. The best way to test for mediation effects is by counting the Variance Accounted For (VAF) value, which can determine the indirect effect relative to the total effect [25].

According to Baron and Kenny [26] the causal step approach has four mediation effects, they are: (1) nonmediation, if VAF value < 20%; (2) partial mediation, if VAF value is around  $20 \leq 80\%$ ; (3) full mediation, if VAF value > 80%; and (4) suppressed mediation, if the direct effect sign changed after inclusion of the mediation variable.

## **3. Result and discussion**

### **3.1 Validity test**

The validation of reflective indicators was done through: (1) convergent validity; (2) discriminant validity; and (3) reliability test consists of (a) indicator

reliability; and (b) consistency internal reliability both composite reliability and Cronbach alpha [23].

3.2 Convergent validity

Convergent validity testing is performed to identify the items of instrument indicators as indicators from a latent variable (see **Table 2**). The convergent validity test result shown that all of the outer loading values are more than 0.6 (>0.6). At last, it can be seen that this research has met the requirements of the convergent validity [23, 25].

| No                  | Name of Village                | Sample Size Needed              |
|---------------------|--------------------------------|---------------------------------|
| 1                   | Wonorejo Village               | $62/170 \times 120 = 43$ people |
| 2                   | Sumber Anyar Village           | $50/170 \times 120 = 35$ people |
| 3                   | Sumber Waru Village            | $33/170 \times 120 = 24$ people |
| 4                   | Watu Kebo Village              | $15/170 \times 120 = 10$ people |
| 5                   | Bajulmati Village              | $10/170 \times 120 = 8$ people  |
| 6                   | Staff of Baluran National Park | $71/170 \times 120 = 50$ people |
| The Total of Sampel |                                | 170                             |

**Table 1.**  
*Sample size of the Forestry Community Training Center and The Staff of Baluran National Park (BNP).*

| Variable | Indicators | Outer Loading | Remark |
|----------|------------|---------------|--------|
| KLM      | $X_{11}$   | 0.652         | Valid  |
|          | $X_{12}$   | 0.681         | Valid  |
|          | $X_{13}$   | 0.715         | Valid  |
|          | $X_{14}$   | 0.733         | Valid  |
|          | $X_{15}$   | 0.803         | Valid  |
| ISN      | $X_{21}$   | 0.775         | Valid  |
|          | $X_{22}$   | 0.986         | Valid  |
|          | $X_{23}$   | 0.982         | Valid  |
|          | $X_{24}$   | 0.984         | Valid  |
| MDS      | $X_{31}$   | 0.898         | Valid  |
|          | $X_{32}$   | 0.855         | Valid  |
|          | $X_{33}$   | 0.812         | Valid  |
|          | $X_{34}$   | 0.796         | Valid  |
|          | $X_{35}$   | 0.910         | Valid  |
| PAR      | $Z_{11}$   | 0.859         | Valid  |
|          | $Z_{12}$   | 0.915         | Valid  |
|          | $Z_{13}$   | 0.891         | Valid  |
|          | $Z_{14}$   | 0.902         | Valid  |

**Table 2.**  
*Convergent validity test.*

3.3 Discriminant validity

A discriminant validity test (**Table 3**) was performed after those for convergent validity. It is to identify the validity of instrument items in a model [27]. The discriminant construct validity test will meet the criteria of the discriminant validity if the square roots of AVE are higher than the variable correlation score. KLM (X1) has a square root of AVE 0.793 is more than its correlation 0.669, 0.281, 0.669. ISN (X2) is 0.938, its correlation scores are 0.669, 0.299, and 0.681. MDS (X3) is 0.755, and its correlation scores are 0.281, 0.299, and 0.304. PAR (Z1) is 0.892, and its correlation scores are 0.669, 0.681, and 0.304. The criteria of discriminant validity are therefore met [23, 25]

3.4 Reliability test

Reliability test (**Table 4**) consist of indicator reliability and consistency internal reliability both composite reliability and Cronbach alpha. The reliability test shows that all of the outer loadings are >0.6, and p-value is <0.001 less than 0.05, which means all instruments are reliable [23, 25].

3.5 Consistency internal reliability

Consistency internal reliability was tested both for composite reliability, and Cronbach alpha. The consistency of internal reliability values in this study also more than 0.60 (>0.60), and are thus reliable (**Table 5**).

3.6 Composite reliability

The composite reliability coefficients values in this research are more than 0.70 (see **Table 5**). All variables meet reliability requirements [23]. The value for KLM (forest institution connectedness) is 0.846, ISN (incentive participation program) is 0.967, MDS (social capital) is 0.868, and PAR (public participation) is 0.940.

3.7 Cronbach alpha

Internal consistency test (**Table 6**) can be proved by the exact Cronbach alpha values. The Cronbach alpha are as follows: KLM (X<sub>1</sub>) is 0.770, ISN (X<sub>2</sub>) is 0.951, MDS (X<sub>3</sub>) is 0.809, and PAR (Z<sub>1</sub>) is 0.914. The criteria for internal consistency are therefore met [25].

3.8 Indicator reliability

The indicator reliability test (**Table 7**) was done in order to ensure the quality of variable with formative indicators. This test result can be gained from the significant of weights or indicator weights. All of the formative indicators have met the

| Correlations among lvs. with sq. rts. of AVEs |                |       |       |       |       |
|---|----------------|-------|-------|-------|-------|
|   | Sq. rts of AVE | X1    | X2    | X3    | Z1    |
| KLM (Forest Institution Connectedness)        | 0.793          |       | 0.669 | 0.281 | 0.669 |
| ISN (incentive)                               | 0.938          | 0.669 |       | 0.299 | 0.681 |
| MDS (Social Capital)                          | 0.755          | 0.281 | 0.299 |       | 0.304 |
| PAR (Public Participation)                    | 0.892          | 0.669 | 0.681 | 0.304 |       |

Table 3.  
Discriminant validity test.

| Variable              | Indicators      | Outer Loading | P-value | Remark |
|-----------------------|-----------------|---------------|---------|--------|
| KLM (X <sub>1</sub> ) | X <sub>11</sub> | 0.652         | <0.001  | Valid  |
|                       | X <sub>12</sub> | 0.681         | <0.001  | Valid  |
|                       | X <sub>13</sub> | 0.715         | <0.001  | Valid  |
|                       | X <sub>14</sub> | 0.733         | <0.001  | Valid  |
|                       | X <sub>15</sub> | 0.803         | <0.001  | Valid  |
| ISN (X <sub>2</sub> ) | X <sub>21</sub> | 0.775         | <0.001  | Valid  |
|                       | X <sub>22</sub> | 0.986         | <0.001  | Valid  |
|                       | X <sub>23</sub> | 0.982         | <0.001  | Valid  |
|                       | X <sub>24</sub> | 0.984         | <0.001  | Valid  |
| MDS (X <sub>3</sub> ) | X <sub>31</sub> | 0.898         | <0.001  | Valid  |
|                       | X <sub>32</sub> | 0.855         | <0.001  | Valid  |
|                       | X <sub>33</sub> | 0.812         | <0.001  | Valid  |
|                       | X <sub>34</sub> | 0.796         | <0.001  | Valid  |
|                       | X <sub>35</sub> | 0.910         | <0.001  | Valid  |
| PAR (Z <sub>1</sub> ) | Z <sub>11</sub> | 0.859         | <0.001  | Valid  |
|                       | Z <sub>12</sub> | 0.915         | <0.001  | Valid  |
|                       | Z <sub>13</sub> | 0.891         | <0.001  | Valid  |
|                       | Z <sub>14</sub> | 0.902         | <0.001  | Valid  |

**Table 4.**  
*Indicators reliability test.*

| Composite reliability coefficients |       |       |       |       |
|------------------------------------|-------|-------|-------|-------|
| Variable                           | KLM   | ISN   | MDS   | PAR   |
| Score                              | 0.846 | 0.967 | 0.868 | 0.940 |
| Remark                             | Valid | Valid | Valid | Valid |

**Table 5.**  
*Composite reliability coefficients.*

| Variable                               | Croanbach's Alpha | Criteria | Remark   |
|--|-------------------|----------|----------|
| KLM (Forest Institution Connectedness) | 0.770             | ≥0.60    | Reliable |
| ISN (incentive)                        | 0.951             | ≥0.60    | Reliable |
| MDS (Social Capital)                   | 0.809             | ≥0.60    | Reliable |
| PAR (Public Participation)             | 0.914             | ≥0.60    | Reliable |

**Table 6.**  
*Internal consistency test (Cronbach’s alpha of each variable).*

requirement of indicator reliability with a p-value less than 0.05 (<0.05) and all instruments are valid [23, 25].

### 3.9 Collinearity

Variable with formative indicators will meet the requirements of collinearity, if the value of variances inflation factor (VIF) is <3.3. KSJ (Welfare) is a latent variable of welfare with four formative indicators, and has the value of variance inflation factor is 2.527 less than 3.3.



3.10 Partial least square analysis

Goodness of fit (inner model) can be evaluated based on R-squared, adj. R-squared, Cronbach alpha, Avg. Var. Ectrac, full collinearity VIF, and Q-squared value (see **Table 8**). R-squared with high value means the model is good and R-squared can be used for response variable.

The results of R-squared for the public participation (PAR) is 0.979 which means that the contribution of the variables incentive participation program (ISN), social capital (MDS), and welfare (KSJ) to the effect on public participation (PAR) is 97.9%, and the remaining 2.1% is attributable to another variable outside the research model.

Composite reliability value and Cronbach alpha can be used to evaluate research instruments. Based on the output, the composite reliability coefficients are 0.846 for KLM, 0.967 for ISN, 0.868 for MDS, 0.907 for KSJ and 0.940 for PAR. They are more than 0.60 and the Cronbach alpha coefficients are 0.770, 0.951, 0.809, 0.861, and 9.14. All of them are more 0.70 for all variables. Therefore, all variables in this research have met the reliability criteria.

The average variances extracted (AVE) is used to evaluate the discriminant validity, with the criterion that values must be >0.50. The AVE values are as follows: (1) forest institution connectedness (KLM) variable is 0.543; (2) incentive participation program (ISN) variable is 0.880; (2) social capital (MDS) variable is 0.571; (3) welfare (KSJ) variable is 0.713; and (4) public participation (PAR) variable is 0.795. All the variables met the AVE value criterion >0.50 and meet the discriminant validity.

Full collinearity VIFs is a complete collinearity test consisting of vertical and lateral multicollinearity. Lateral collinearity is a collinearity between a predictor latent variable and criteria variables and can be used to test the common method bias. The criterion for the full collinearity test values <3.3. This research has met the full collinearity requirements for all variables; they are 2.228 for KLM, 2.254 for ISN, 1.126 for MDS, and 2.527 for KSJ.

Q-squared is used as a predictive test of the relation between the predictor latent variables and the criterion variables. The Q-squared result can be negative, but the R-squared result must be positive. The estimation result of this output above shows good predictive value; at 0.708 and 0.852, values are more than zero (**Table 8**).

3.11 Loading factor (outer model)

The outer loading values are used to know indicator’s weight of every variable. Indicators with high outer loading values show they are strong variable measures (**Table 9**). Forest institutions’ connectedness variable is consist of five indicators (accountability, transparency, belief-based relationship, forest rules, and information access) are categorized as not good condition (3.86 < 4.00). The highest outer loading is forest rules (0.803) and means score (4.00) is reflected as good condition. But the lowest mean score is accountability (3.71) is reflected as not good condition and effects the level of public participation.

| Variable      | Indicators                            | P-Value | VIF   | Remark |
|---------------|---------------------------------------|---------|-------|--------|
| KSJ (Welfare) | Y 11: household income                | <0.001  | 2.114 | Valid  |
|               | Y 12: household education             | <0.001  | 8.001 | Valid  |
|               | Y 13: household health                | 0.003   | 1.441 | Valid  |
|               | Y 14: household supporting facilities | <0.001  | 6.112 | Valid  |

Table 7.  
Indicator reliability test of indicator weights.

| Latent variable coefficients       | KLM   | ISN   | MDS   | KSJ   | PAR   |
|------------------------------------|-------|-------|-------|-------|-------|
| R-squared                          |       |       |       | 0.703 | 0.979 |
| Adjusted R-squared                 |       |       |       | 0.695 | 0.979 |
| Composite reliability coefficients | 0.846 | 0.967 | 0.868 | 0.907 | 0.940 |
| Cronbach's alpha coefficients      | 0.770 | 0.951 | 0.809 | 0.861 | 0.914 |
| Average variances extracted        | 0.543 | 0.880 | 0.571 | 0.713 | 0.795 |
| Full collinearity VIFs             | 2.228 | 2.254 | 1.126 | 2.527 | 0.720 |
| Q-squared coefficients             |       |       |       | 0.708 | 0.852 |

**Table 8.**  
*Output latent variable coefficients.*

Incentive participation program variable consist of four indicators (incentive participation programs of training, agriculture tools, cash payment, and agriculture land use) are categorized as not good conditions ( $3.81 < 4.00$ ). The highest outer loading is the incentive participation program of agriculture tools (0.986), mean score (3.97), but it is still reflected not good condition ( $< 4.00$ ). The lowest mean score is the incentive participation program of training (3.67) is reflected as not good condition and effects the level of public participation, especially in developing the quality of human resources.

The social capital variable is consist of five indicators (reciprocity, social norms, network interaction, level of trust in the community group, and buffer villages group donations) are categorized as not good conditions ( $3.93 < 4.00$ ). The highest outer loading is social norms (0.819) and means score is (4.21) is reflected as good condition. But the lowest mean score is buffer village group's donation (3.64) is reflected as not good condition and effects the level of public participation.

Welfare variable is consist of five indicators (household income, household education, household health, and household supporting facilities) are categorized as not good condition ( $3.81 < 4.00$ ). The highest outer loading is family income (0.877) and mean score (3.86) is reflected as not good condition and effects the level of public participation ( $< 4.00$ ). The lowest mean score is family supporting facilities (3.73) is reflected as not good condition and effects the level of public participation.

Public participation variable is consist of four indicators (participation in planning program, participation in implementation, participation in benefit-sharing, and participation in monitoring and evaluation) are categorized as not good condition with average score is 3.85 or less than 4.00. The highest outer loading is participation in implementation (0.915) and mean score (3.85). The lowest mean score is participation in planning program (3.68) is reflected as not good condition.

**3.12 Path coefficients and P values**

Path coefficients and p values (**Table 10**) and direct hypothesis (**Table 11**) that: (**H1<sub>a</sub>**) KLM (forest institutions' connectedness) does not have a positive significant effect (0.087) on public participation, with p-value 0.166; (**H1<sub>b</sub>**) KSJ (Welfare) mediates the effect of KLM (forest institution connectedness) on public participation (0.552), with p-value  $< 0.001$ ; (**H2<sub>a</sub>**) INS (incentive participation program) has shown a positive significant effect (0.196) on public participation (p-value 0.013); (**H2<sub>b</sub>**) welfare (KSJ) mediates the effect of ISN (incentive participation program) (0.273) on public participation with p-value  $< 0.001$ ; (**H3<sub>a</sub>**) MDS (social capital) has a positive significant effect (0.141) on public participation, with p-value 0.056; (**H3<sub>b</sub>**) welfare (KSJ) mediates the effect of MDS (social capital) on public participation (0.177), with p-value 0.023; (**H4**) welfare (KSJ) has a positive significant effect (0.782) on public participation with p-value  $< 0.001$ .

| Variables                             | Indicators   | Outer Loading | Mean of Indicator | Mean of Variable |
|---------------------------------------|--|---------------|-------------------|------------------|
| Forest Institution Connectedness (X1) | Accountability (X <sub>11</sub> )                              | 0.614         | 3.71              | 3.86             |
|                                       | Transparency (X <sub>12</sub> )                                | 0.687         | 3.81              |                  |
|                                       | Belief Based Relationship (X <sub>13</sub> )                   | 0.642         | 3.78              |                  |
|                                       | Forest Rules (X <sub>14</sub> )                                | 0.803         | 4.00              |                  |
|                                       | Information Access (X <sub>15</sub> )                          | 0.733         | 3.99              |                  |
| Incentive (X2)                        | Incentive of Training (X <sub>2.1</sub> )                      | 0.775         | 3.67              | 3.81             |
|                                       | Incentive of Agriculture Tools (X <sub>2.2</sub> )             | 0.986         | 3.97              |                  |
|                                       | Incentive of Cash Payement (X <sub>2.3</sub> )                 | 0.982         | 3.78              |                  |
|                                       | Incentive of Agriculture Land Using (X <sub>2.4</sub> )        | 0.984         | 3.83              |                  |
| Social Capital (X3)                   | Reciprocity (X <sub>3.1</sub> )                                | 0.753         | 3.98              | 3.93             |
|                                       | Social Norms (X <sub>3.2</sub> )                               | 0.819         | 4.21              |                  |
|                                       | Network Interaction (X <sub>3.3</sub> )                        | 0.620         | 3.88              |                  |
|                                       | Level of Trust to the Community Group (X <sub>3.4</sub> )      | 0.780         | 3.93              |                  |
|                                       | Buffer Vaillages Group's Donation (X <sub>3.5</sub> )          | 0.789         | 3.64              |                  |
| Welfare (Y1)                          | Family Income (Y <sub>1.1</sub> )                              | 0.866         | 3.86              | 3.81             |
|                                       | Family Edution (Y <sub>1.2</sub> )                             | 0.664         | 3.82              |                  |
|                                       | Family Healty (Y <sub>1.3</sub> )                              | 0.812         | 3.85              |                  |
|                                       | Family Supporting Facilities (Y <sub>1.4</sub> )               | 0.636         | 3.73              |                  |
| Public Participation (Z1)             | Participation in planning program (Z <sub>1.1</sub> )          | 0.859         | 3.68              | 3.85             |
|                                       | Participation in implementation (Z <sub>1.2</sub> )            | 0.915         | 4.03              |                  |
|                                       | Participation in benefit-sharing (Z <sub>1.3</sub> )           | 0.891         | 3.81              |                  |
|                                       | Participation in evaluation and monitoring (Z <sub>1.4</sub> ) | 0.902         | 3.88              |                  |

Table 9.  
Outer loading value of variable.

| Path coefficients |        |        |       |        |     |
|-------------------|--------|--------|-------|--------|-----|
|                   | KLM    | ISN    | MDS   | KSJ    | PAR |
| KLM               |        |        |       |        |     |
| ISN               |        |        |       |        |     |
| MDS               |        |        |       |        |     |
| KSJ               | 0.552  | 0.273  | 0.177 |        |     |
| PAR               | 0.087  | 0.196  | 0.141 | 0.782  |     |
| P values          |        |        |       |        |     |
|                   | KLM    | ISN    | MDS   | KSJ    | PAR |
| KLM               |        |        |       |        |     |
| ISN               |        |        |       |        |     |
| MDS               |        |        |       |        |     |
| KSJ               | <0.001 | <0.001 | 0.023 |        |     |
| PAR               | 0.166  | 0.013  | 0.056 | <0.001 |     |

Table 10.  
Path coefficients and P values.

3.13 Directional hypothesis

Forest institutions’ connectedness does not have a positive significant effect (0.087) on public participation, with p-value 0.166. Because p-value 0.166 is more than 0.05 (0.166 > 0.05), **H<sub>1a</sub>** is not accepted. This test result does not provide empirical support for the findings of Baynes et al. [7], Muro and Namusonge [8], and Lise [9].

The incentive participation program has a positive significant effect (0.196) on public participation, with p-value 0.013. Because p-value 0.013 is less than 0.5

( $0.013 < 0.05$ ),  $H_{2a}$  is accepted. The results support the theory of incentive participation programs of Robbin [28], Adhikari et al. [12], Djamhuri [13], and Kaseya and Kihonge [14].

Social capital gives significant positive effect on public participation (0.1401), with p-value 0.056. Because p-value 0.056 is less than 0.05 ( $0.056 < 0.5$ ),  $H_{3a}$  is accepted. The test results support the theory of social capita [29], as well as supporting the empirical research of Sara [18] and Sharpe [19].

3.14 Indirect effect hypothesis

Path coefficient indirect effect (Table 12) shows that welfare mediates the effect of forest institution on public participation (0.552), with p-value  $< 0.001$ . Because p-value  $< 0.001$  is less than 0.05 ( $< 0.001 < 0.5$ ), hypothesis  $H_{1b}$  is accepted. The test results provide empirical support for the work of Hans-Jurgen [10] and Akib et al. [11].

Welfare mediates incentive participation program on public participation (0.273), with p-value  $< 0.001$ , less than 0.05 ( $< 0.001 < 0.5$ ). Hypothesis  $H_{2b}$  is thus accepted. The test results provide empirical support for the work of Rahut et al. [15], William and Ayuk [16], Das and Sarker [17].

Social capital by the mediation of welfare has a positive significant effect on public participation (0.177), with p-value 0.023, less than 0.05 ( $0.023 < 0.5$ ). Hypothesis  $H_{3b}$  is therefore accepted. The results are related to the social capital theory [20]. In addition, Fukuyama [30] added that the social capital and the level of welfare are closely related in a community or nation [29]. This result provides empirical support for the research of Grootaet [20], Narayan and Pritchett [21].

Welfare contributes significant positive effect on public participation by 0.782 on public participation, with p-value  $< 0.001$ . Because p-value  $< 0.001$  is less than 0.05 ( $< 0.001 < 0.5$ ), hypothesis  $H_4$  is accepted. This test provides empirical support for the research of Rahut et al. [15] and Akamani and Hall [22].

3.15 Mediation effect analysis

To test mediation effect, this research uses Baron and Kenny’s causal-step approach. Baron and Kenny [26] using causal step approach which has four mediation effects, they are: (a) first step, directional hypothesis if the results are significant/positive; (b) second step, the indirect hypothesis was tested whether it is significant/positive; (c) third step, test mediation effects using VAF (Variance Accounted For) with the criteria: VAF value  $> 80\%$  means full mediation,  $20\% \leq \text{VAF} \leq 80\%$  means partial mediation; and  $\text{VAF} < 20\%$  means no mediation. The mediation effect is significant/positive if p-value indirect effect is less than 0.05 [25].

Figure 1 shows that all of the direct effects are significant/positive because the p-values are less than 0.05. Then the indirect effects (mediation variables) are included, as shown in Figure 2.

| Hypothesis | Direct Effect Among Latent Variables |    |                    | Path Coefficient Value | P-value | Remark          |
|------------|--------------------------------------|----|--------------------|------------------------|---------|-----------------|
|            | Independent Variable                 | To | Dependent Variable |                        |         |                 |
| H1a        | KLM                                  | →  | PAR                | 0.087                  | 0.166   | Not Significant |
| H2a        | ISN                                  | →  | PAR                | 0.196                  | 0.013   | Significant     |
| H3a        | MDS                                  | →  | PAR                | 0.141                  | 0.056   | Significant     |

Table 11.  
Direct hypothesis.



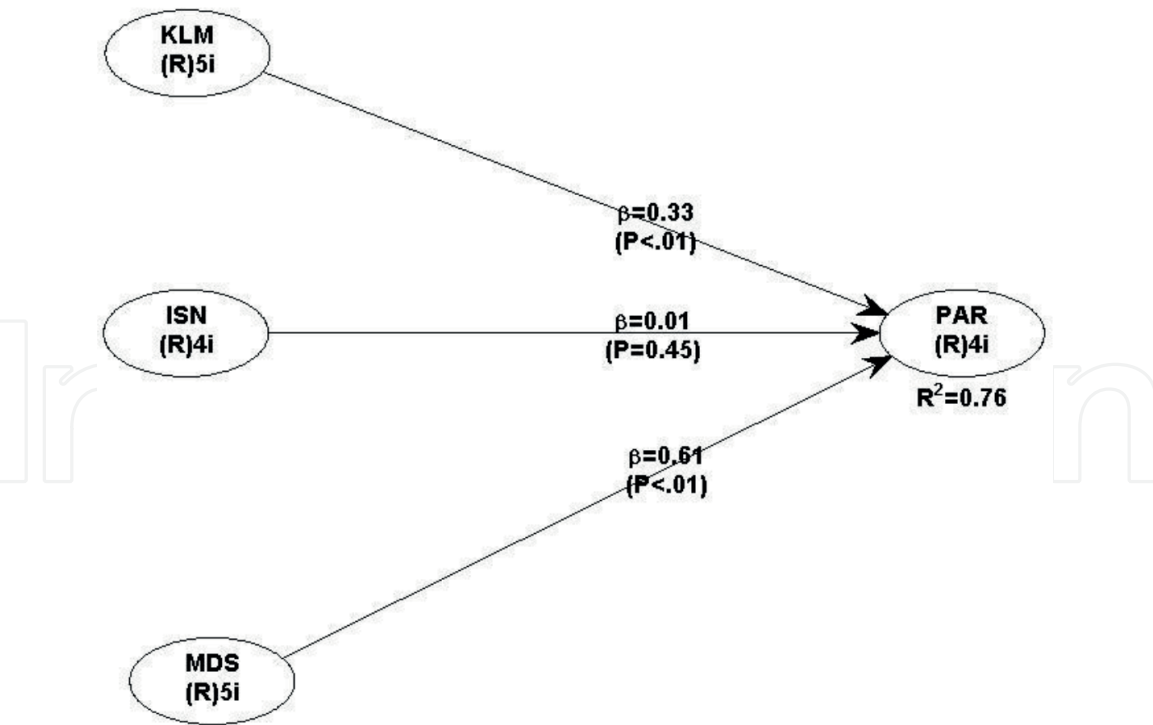


Figure 1.  
Direct effect without including mediation.

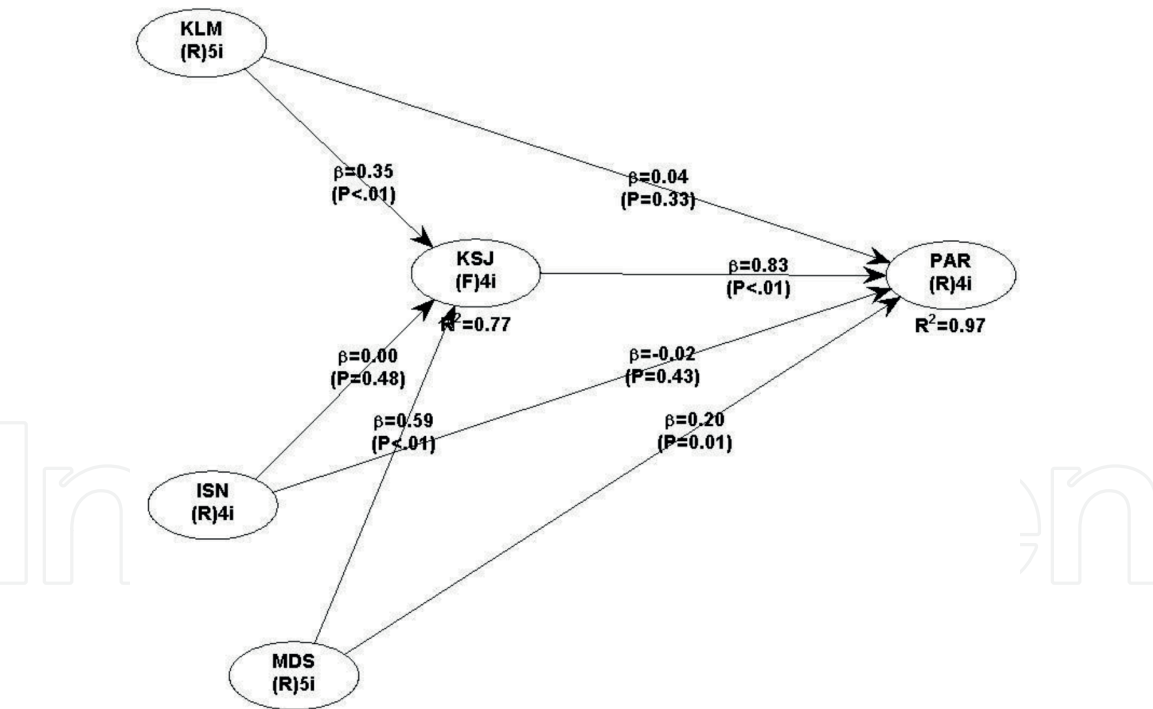


Figure 2.  
Indirect effect including mediation.

Figure 2 shows all of the indirect effects are significant/positive because p-values are less than 0.05. The third step is to test mediation effect by using the VAF formula. The formula of  $VAF = (p_{12} \times p_{23}) / (p_{12} \times p_{23} + p_{13})$ . The results of the mediation test using the VAF method are as follows:

1. Forest institutions' connectedness effect on public participation in the mediation of welfare is significant and positive with p-value  $<0.001$  ( $<0.05$ )



$$\begin{aligned} \text{VAF} &= (0.552 \times 0.782) / (0.552 \times 0.782 + 0.087). \\ \text{VAF} &= 0.431 / 0.518. \\ \text{VAF} &= 0.832. \\ \text{VAF} &= 83.2\%. \end{aligned}$$

This means that welfare mediates the effect of forest institutions' connectedness on public participation as a full mediation.

2. Incentive participation program's effect on public participation in the mediation of welfare is significant and positive, with p-value <0.001 (<0.05)

$$\begin{aligned} \text{VAF} &= (0.273 \times 0.782) / (0.273 \times 0.782 + 0.196). \\ \text{VAF} &= 0.213 / 0.409. \\ \text{VAF} &= 0.520. \\ \text{VAF} &= 52.0\%. \end{aligned}$$

This means that welfare mediates incentive participation program's effect on public participation as a partial mediation.

3. Social capital's effect on public participation in the mediation of welfare is significant and positive, with p-value 0.023 (<0.05)

$$\begin{aligned} \text{VAF} &= (0.177 \times 0.782) / (0.177 \times 0.782 + 0.141). \\ \text{VAF} &= 0.138 / 0.279. \\ \text{VAF} &= 0.494. \\ \text{VAF} &= 49.4\%. \end{aligned}$$

This means welfare mediates social capital's effect on public participation as a partial mediation.

Based on the descriptive analysis, both direct and indirect hypothesis results (Tables 11 and 12), for all variables can be summarized in Table 13.

3.16 Analysis of public participation and welfare as mediator of forest management

The analysis of public participation in this research is based on the characteristics of five buffer villages. They are Wonorejo, Sumber Waru, Sumber Anyar, Watu Kebo and Bajul Mati.

The buffer villages have potential to be developed into bigger villages. Management of regions is required in order to avoid disturbing the forest conservation in Baluran National Park.

The contribution of nontimber forest product (NTFP) to family income is around 19.79% up and 61.44% of their total annual income (Table 14).

| Hypothesis | Indirect Effect Among Latent Variables |     |                    | Path Coefficient Value | P-value | Remark      |
|------------|--|-----|--------------------|------------------------|---------|-------------|
|            | Independent Variable                   | To  | Dependent Variable |                        |         |             |
| H1b        | KLM                                    | PAR | KSJ                | 0.552                  | <0.001  | Significant |
| H2b        | ISN                                    | PAR | KSJ                | 0.273                  | <0.001  | Significant |
| H3b        | MDS                                    | PAR | KSJ                | 0.177                  | 0.023   | Significant |
| 4          | KSJ                                    | →   | PAR                | 0.782                  | <0.001  | Significant |

Table 12.  
Path coefficient indirect effect.

| Hypothesis | Direct Effect Among Latent Variables   |     |                    | Path Coefficient Value | P-value | Remark          |
|------------|--|-----|--------------------|------------------------|---------|-----------------|
|            | Independent Variable                   | To  | Dependent Variable |                        |         |                 |
| H1a        | KLM                                    | →   | PAR                | 0.087                  | 0.166   | Not Significant |
| H2a        | ISN                                    | →   | PAR                | 0.196                  | 0.013   | Significant     |
| H3a        | MDS                                    | →   | PAR                | 0.141                  | 0.056   | Significant     |
| Hypothesis | Indirect Effect Among Latent Variables |     |                    | Path Coefficient Value | P-value | Remark          |
|            | Independent Variable                   | To  | Dependent Variable |                        |         |                 |
| H1b        | KLM                                    | PAR | KSJ                | 0.552                  | <0.001  | Significant     |
| H2b        | ISN                                    | PAR | KSJ                | 0.273                  | <0.001  | Significant     |
| H3b        | MDS                                    | PAR | KSJ                | 0.177                  | 0.023   | Significant     |
| 4          | KSJ                                    | →   | PAR                | 0.782                  | <0.001  | Significant     |

Table 13.  
Hypothesis test results, summary of direct and indirect effect.

This research also empirically supports research from Baluran [5] and Syafi'i [31]. The total income of user's forest product in buffer villages of Baluran National Park is about Rp. 100,900,000 a year.

3.17 Public participation in the forestry planning program in Baluran National park

The people in the buffer villages have not been widely involved in the forestry management planning (shown in Table 15). Their participation in decision making in the meeting of the forestry planning program by forestry community training center is 28.2%, and by Forest Institution of Baluran National Park is 20.6%.

3.18 Public participation in the implementation program

The members of Forestry Community Training Center participated by giving inputs of the forestry planning program in BNP (23.5%) and giving efforts and actions of the forestry planning program (17.6%) as shown in Table 16.

| No    | Name fo Villages | Agriculture's Income | Non Timber Forest's Product (NTFP) | Cattle's Business Income | Total       | Contribution of NTFP (%) |
|-------|------------------|----------------------|------------------------------------|--------------------------|-------------|--------------------------|
| 1     | Wonorejo         | 18,500,000           | 7,500,000                          | 11,900,000               | 37,900,000  | 19.79                    |
| 2     | Bajul Mati       | 4,400,000            | 3,500,000                          | 2,000,000                | 9,900,000   | 35.35                    |
| 3     | Watu Kebo        | 7,900,000            | 21,350,000                         | 5,500,000                | 34,750,000  | 61.44                    |
| 4     | Sumber Anyar     | 3,100,000            | 3,450,000                          | 2,300,000                | 8,850,000   | 38.98                    |
| 5     | Sumber Waru      | 3,300,000            | 3,800,000                          | 2,400,000                | 9,500,000   | 40.00                    |
| Total |                  | 37,200,000           | 39,600,000                         | 24,100,000               | 100,900,000 |                          |

Table 14.  
Contribution of nontimber forest product (NTFP) on family income.

| No | Public Participation of Forestry Planning Program  | Level of Participation |      |        |      |     |       |       |       |
|----|--|------------------------|------|--------|------|-----|-------|-------|-------|
|    |  | High                   |      | Middle |      | Low |       | Total |       |
|    |  | f                      | %    | f      | %    | f   | %     | f     | %     |
| 1  | Members of Forestry Community Training Center receive invitation of meeting to make decision held by BNP management    | 48                     | 28.2 | 67     | 39.4 | 55  | 32.35 | 170   | 100.0 |
| 2  | Members of Forestry Community Training Center have opportunities to give suggestions to make forestry planning program | 35                     | 20.6 | 60     | 35.3 | 75  | 44.12 | 170   | 100.0 |

Table 15.  
Public participation in the forestry planning program in Baluran National Park.

3.19 Public participation in benefit sharing

The members of the Forestry Community Training Center have participated in the benefit-sharing from forestry management to increase their family’s income with value 21.8%, and have participated in forest conservation management with value 17.1% (Table 17).

3.20 Public participation in evaluation and monitoring

Table 18 shows that 17.6% of members of Forestry Community Training Center has participated in the evaluation of Baluran Forest in Baluran National Park, and 22.4% have participated in the monitoring of forest conservation.

3.21 Classification of public participation in forestry management in Baluran National Park

According to Cohen [32], the level of public participation is high when people involved in four stages of the management process. They are (1) program planning participation; (2) actuating participation; (3) benefit-sharing participation; and (4) evaluation and monitoring participation. Scores > 21 indicate high level, 17–21 medium level, and <17 low-level participation [32].

| No | Public Participation in Implementing Program  | Level of Participation |      |        |      |     |      |       |       |
|----|---|------------------------|------|--------|------|-----|------|-------|-------|
|    |   | High                   |      | Middle |      | Low |      | Total |       |
|    |   | f                      | %    | f      | %    | f   | %    | f     | %     |
| 1  | Members of Forestry Community Training Center have Participated to give inputs of the forestry planning program in BNP                | 40                     | 23.5 | 85     | 50.0 | 45  | 26.5 | 170   | 100.0 |
| 2  | Members of Forestry Community Training Center have Participated to give efforts, and actions) of the forestry planning program in BNP | 30                     | 17.6 | 75     | 44.1 | 65  | 38.2 | 170   | 100.0 |

Table 16.  
Public participation in implementing program.

| No | Public Participation of Benefit Sharing  | Level of Participation |      |        |      |     |      |       |       |
|----|--|------------------------|------|--------|------|-----|------|-------|-------|
|    |  | High                   |      | Middle |      | Low |      | Total |       |
|    |  | f                      | %    | f      | %    | f   | %    | f     | %     |
| 1  | Member of Forestry Community Training Center have participated in gaining of benefit from forestry management to increase family | 37                     | 21.8 | 87     | 51.2 | 46  | 27.1 | 170   | 100.0 |
| 2  | Member of Forestry Community Training Center have participated in the benefit of forest conservation management                  | 29                     | 17.1 | 93     | 54.7 | 48  | 28.2 | 170   | 100.0 |

Table 17.  
Public participation of benefit sharing.

| No | Public Participation of Evaluation and Monitoring  | Level of Participation |      |        |      |     |      |       |       |
|----|--|------------------------|------|--------|------|-----|------|-------|-------|
|    |  | High                   |      | Middle |      | Low |      | Total |       |
|    |  | f                      | %    | f      | %    | f   | %    | f     | %     |
| 1  | Member of Forestry Community Training Center have participated in evaluation of Baluran forest in the Baluran National Park      | 30                     | 17.6 | 86     | 50.6 | 54  | 31.8 | 170   | 100.0 |
| 2  | Member of Forestry Community Training Center have participated in monitoring of forest conservation in the Baluran National Park | 38                     | 22.4 | 82     | 48.2 | 50  | 29.4 | 170   | 100.0 |

Table 18.  
Public participation in evaluation and monitoring.

| No | Level of Public Participation<br>Category | Name of Buffer Villages |             |              |            |           | Total of<br>Respondent | Percentage<br>(%) |
|----|---|-------------------------|-------------|--------------|------------|-----------|------------------------|-------------------|
|    |   | Wonorejo                | Sumber Waru | Sumber Anyar | Bajul Mati | Watu Kebo |                        |                   |
| 1  | Low Participation (Score <17)             | 46                      | 16          | 11           | 2          | 5         | 80                     | 47.1              |
| 2  | Middle Participation (Score 17-21)        | 34                      | 12          | 9            | 1          | 1         | 57                     | 33.5              |
| 3  | High Participation (Score >21)            | 15                      | 7           | 5            | 3          | 3         | 33                     | 19.4              |
|    | Total                                     | 95                      | 35          | 25           | 6          | 9         | 170                    |                   |

**Table 19.**  
*Classification of public participation in forestry management in Baluran National Park.*

**Table 19** shows that public participation from the five buffer villages (Wonorejo, Sumber Waru, Sumber Anyar, Bajul Mati, and Watu Kebo) is low level at 47.1%, the middle level at 33.5%, and high level 19.4%.

4. Conclusions

Based on the research findings, several conclusions can be stated as follows. Public welfare is the most important factor in forest management. Especially in the Baluran National Park, that the public welfare is the main factor affecting public participation. That is why, the public participation will increase if: (1) there is a good relationship between the forest institution connectedness and local people and make them welfare and better in their life than before; (2) the forest institution provide incentive participation program that can increase the local people’s welfare and better in their life; (3) there is a good social capital that can increase the local people’s welfare because they are more having skills, experiences and productivity; (4) the public welfare always increase and make their life better; (5) public welfare is the most important factor to increase public participation in forest management; (6) the contribution of nontimber forest product (NTFP) to family income getting increased; (7) the forest institutions give opportunities to member of forestry community training center in the forestry planning program, implementing program, benefit sharing, and evaluation and monitoring. Classification of public participation in forestry management in the Baluran National Park shows that the public participation needs to be increased (19.4%).

5. Policy recommendations

Based on the findings of this study, the following recommendations are proposed:

1. The forest institution of Baluran National Park should improve its relationship between the institution connectedness and local people. Because of this, the institution should know what the local people needs.
2. The forest institution should increase the incentive participation program (incentive participation program of training), because it effects the level of public participation;
3. The social capital should be improved to create the local people’s welfare by giving incentive participation program of training in order to improve the skills, experiences and productivity of local people;



4. The forest institution of Baluran National Park should improve the public welfare by focusing it on each planning program of forest management;
5. The contribution of nontimber forest product (NTFP) to family income must be increased;
6. The forest institutions give opportunities to member of forestry community training center in the forestry planning program, implementing program, benefit sharing, and evaluation and monitoring. Classification of public participation in forestry management in the Baluran National Park shows that the public participation needs to be increased (19.4%).
7. Future research should develop socio-demography variable as a predictor variable of public participation in optimizing the level of public participation as many researchers using it in their study.

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